O'REILLY®

Compliments of ORACLE

What Is Augmented Analytics?

Powering Your Data with AI

Alice LaPlante

REPORT

Augmented Analytics

Empower Business with AI and Data-Driven Insights

Learn More

oracle.com/analytics

ORACLE

What Is Augmented Analytics?

Powering Your Data with AI

Alice LaPlante

Beijing • Boston • Farnham • Sebastopol • Tokyo O'REILLY®

What Is Augmented Analytics?
by Alice LaPlante

Copyright © 2019 O'Reilly Media, Inc. All rights reserved.

Printed in the United States of America.

Published by O'Reilly Media, Inc., 1005 Gravenstein Highway North, Sebastopol, CA 95472.

O'Reilly books may be purchased for educational, business, or sales promotional use. Online editions are also available for most titles (*http://oreilly.com*). For more information, contact our corporate/institutional sales department: 800-998-9938 or *corporate@oreilly.com*.

Acquisitions Editor: Jonathan Hassell
Development Editor: Melissa Potter
Production Editor: Deborah Baker
Copyeditor: Octal Publishing, LLC
Proofreader: Charles Roumeliotis
Interior Designer: David Futato
Cover Designer: Karen Montgomery
Illustrator: Rebecca Demarest

July 2019: First Edition

Revision History for the First Edition
2019-07-02: First Release

The O'Reilly logo is a registered trademark of O'Reilly Media, Inc. *What Is Augmented Analytics?*, the cover image, and related trade dress are trademarks of O'Reilly Media, Inc.

The views expressed in this work are those of the author, and do not represent the publisher's views. While the publisher and the author have used good faith efforts to ensure that the information and instructions contained in this work are accurate, the publisher and the author disclaim all responsibility for errors or omissions, including without limitation responsibility for damages resulting from the use of or reliance on this work. Use of the information and instructions contained in this work is at your own risk. If any code samples or other technology this work contains or describes is subject to open source licenses or the intellectual property rights of others, it is your responsibility to ensure that your use thereof complies with such licenses and/or rights.

This work is part of a collaboration between O'Reilly and Oracle. See our statement of editorial independence.

978-1-492-05842-7

[LSI]

Table of Contents

What Is Augmented Analytics? **1**
Executive Summary 1
A Growing Market 3
Augmented Analytics: A Primer 3
Benefits and Roadblocks of Augmented Analytics 11
Who Is Using Augmented Analytics? 13
Best Practices for Augmented Analytics 14
Real-World Uses of Augmented Analytics 17
Riverbed 22
Conclusion 29

What Is Augmented Analytics?

Executive Summary

Businesses are collecting ever-larger volumes of data—structured and unstructured alike. IDC predicts that the "global datasphere" will grow from 33 zettabytes (ZB) in 2018 to 175 ZB by 2025. This number is staggering. Note that one zettabyte is approximately equal to one billion terabytes. If each terabyte were a kilometer, a zettabyte would be equivalent to 1,300 round trips to the moon. Now multiply that by 175 and you begin to get the picture of the data deluge today's businesses face.

Businesses that figure out how to make decisions using all this data—those that are "data driven"—will come out ahead. By making better use of their rich information resources to make better decisions, they will perform better than those that operate on gut feel or anecdotal evidence. Forrester found that data-driven companies grow eight times faster than those that work from intuition. Indeed, such "insights-driven" businesses grow, on average, an impressive 30% annually and are forecast to earn $1.8 trillion more than their less-advanced peers by 2021, as illustrated in Figure 1-1.

But traditional analytics solutions will take businesses only so far when attempting to make use of data.

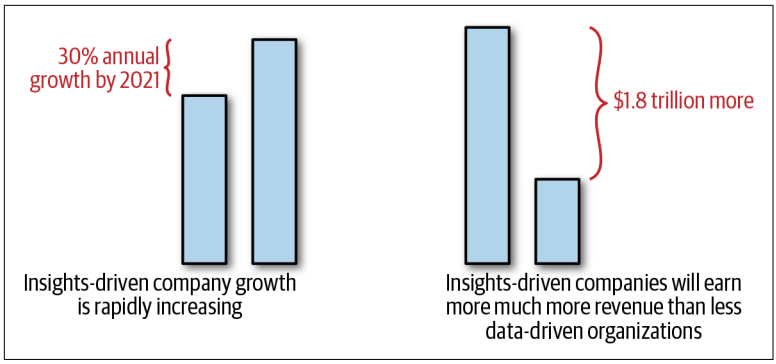

Figure 1-1. Insights-driven businesses have a distinct advantage

Augmented analytics is the latest way to think about data and analytics. It includes embedding artificial intelligence (AI), often in the form of machine learning and natural language processing (NLP), into traditional analytics. It is vastly different from traditional analytics or business intelligence (BI) tools because these AI technologies are always working in the background to continuously learn and enhance results. In particular, augmented analytics allows faster access to insights derived from massive amounts of structured and unstructured data; this intelligence helps uncover hidden insights, remove human bias, and predict bias.

By deploying augmented analytics, not only can organizations democratize use of the data—that is, make it easy for business users and executives to make decisions based on data without help from data scientists or IT professionals—but they can go beyond predictions of future business events or scenarios and access unbiased prescriptive advice on what to do next.

In this report, we precisely define what augmented analytics is. We explain how analytics that are driven by machine learning and AI accelerates time to insights from all of your data, and brings intelligence to help uncover hidden insights, remove human bias, predict results, and even prescribe solutions. We explain best practices for deploying augmented analytics, and show how you can use augmented analytics practically within real-world case studies.

A Growing Market

Augmented analytics is a high-growth force in business today. Analyst firm Research and Markets predicts that the global augmented analytics market will grow from $4.8 billion in 2018 to $18.4 billion by 2023, at a compound annual growth rate (CAGR) of a very impressive 30.6% at a time when the enterprise software market is expected to grow at only an 8% CAGR. Growth of augmented analytics will be highest in the banking, financial services, and insurance markets.

According to a recent survey, embedding machine learning in analytics is a top 10 concern of BI and analytics stakeholders, including users, vendors, and analysts, as shown in Figure 1-2.

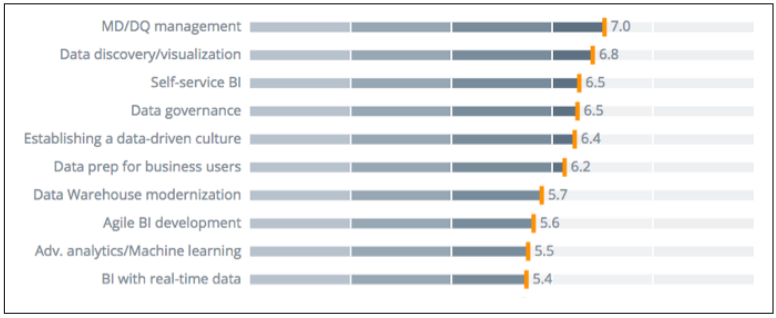

Figure 1-2. Importance of augmented analytics

The McKinsey Global Institute performed an analysis of the value created by embedding machine learning in analytics across 400 enterprise use cases and found that the technologies have the potential to create as much as an additional $15.4 trillion in value by 2020.

But what exactly is augmented analytics? Let's examine that before we move on.

Augmented Analytics: A Primer

Augmented analytics is the marrying of two technologies: analytics and AI. We discuss these separately, and then explain what happens when you bring them together in a single solution or platform that possesses contextual awareness.

Analytics

Analytics is the process of identifying patterns in data. It uses statistics, operations research, and other mathematical tools to make sense of information generated or collected by organizations. It is especially helpful as data volumes grow, when manual calculations are too difficult or complex.

In this era of big data, analytics has become essential to doing everything from understanding sales trends to segmenting customers based on their online behaviors to predicting how much inventory to hold. Yes, the data itself is a tremendous asset, but analytics is what makes data deliver value. And not just to business, but to sports, medicine, engineering, or any activity in which large amounts of data are involved.

AI

AI is the computer science practice of building automated systems that are able to perform tasks that normally require human intelligence. AI encompasses a broad range of technologies, such as computer vision, NLP, and neural networks.

Machine learning is one of the technologies that falls under the umbrella of AI. It makes it possible for systems to learn from processing data. In other words, computer systems don't need to be specifically programmed by humans to anticipate every scenario—they automatically learn and improve from what the data tells them, and from their experience with that data, to make better predictions or decisions.

IDC predicts that enterprise spending on AI solutions will top $77.6 billion in 2022, more than three times the $24.0 billion in 2018, as illustrated in Figure 1-3. This represents an "impressive" 37.3% CAGR between 2017 and 2022, according to IDC.

The top reason that marketers are adopting machine learning and analytics is to improve the customer experience. A full 82% of enterprises already use machine learning to personally target customers, and 64% use it to deliver targeted content and promotions to them.

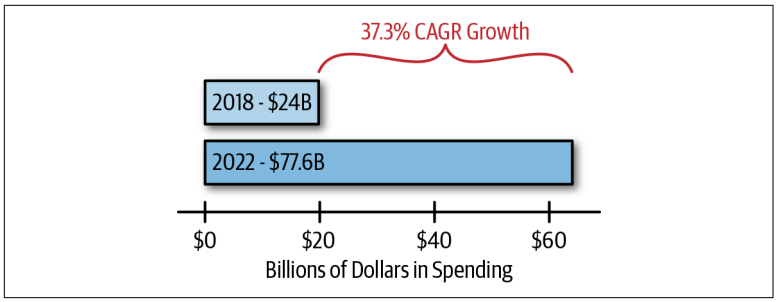

Figure 1-3. Spending on AI solutions is accelerating.

All of this is paying off. McKinsey discovered that 82% of businesses that adopted machine learning received, on average, a 17% return on investment (ROI). Companies in the technology, media and entertainment, and telecommunications fields are achieving the highest ROI.

Data scientists write the mathematical models underlying machine learning systems. Machine learning modeling requires significant skill, education, and training, and the data professionals capable of doing this are scarce. According to LinkedIn, demand for data scientists is "off the charts," with a shortage of more than 150,000 data scientists in the US alone. Happily, many AI and machine learning models in the public domain can be found on community websites for free; businesses can use these models to get started with AI and machine learning.

Bringing It All Together

When you embed machine learning and AI into analytics, you get augmented analytics. Augmented analytics is a technology that automates the selection and preparation of data, the generation of insights, and the communication of those insights. The main thing that is new in this space is the *democratization* of advanced analytics tools. Today, advanced analytics is available to a broad range of business users: executives, managers, line-of-business workers, and citizen data scientists—those employees who have a natural aptitude and excitement for data science without the formal training.

Augmented analytics solutions come prebuilt with models and algorithms so that companies don't need a data scientist to do this work. And these models are hidden under much friendlier interfaces so that users without data science training or PhDs in statistics can use

the tools. Indeed, this is one of the key differences between augmented analytics and traditional analytics. With augmented analytics, the AI and machine learning are built into the product. The very complex model-building and number-crunching is still happening—but it's always on, always working in the background to continuously learn and help users make more accurate decisions.

Because leading augmented analytics platforms feature NLP, this allows nontechnical users to easily ask questions from source data; natural language generation (NLG) then automates the process of translating complex data into text with intelligent recommendations, thereby accelerating analytic insights.

By using automated recommendations for data enrichment and visualization, anyone can quickly uncover unseen patterns and predict trends to optimize the time it takes to go from data to insights to decisions.

The Business Application Research Center (BARC) 2018 Business Intelligence Survey found that augmented analytics will completely transform the user experience, making the shortage of data scientists less urgent for many businesses.

NLP technology also helps drive the ability for nonexpert users to make sense of large amounts of data. Users can ask questions of the data using standard business terminology, and the software will find and query the right data and make the results easy to digest using visualization tools or natural language output.

Augmented analytics can help every data-hungry user of analytics—from business analysts to IT professionals, to the C-suite—in the following ways:

Recommend, prepare, and enrich data
: Rather than having to decide which datasets to query, as with traditional analytics, an augmented analytics solution will recommend which datasets to include in analyses, alert users when those datasets are updated, and suggest new datasets if users are not getting the results they expect.

Create instant charts and graphics
: This helps interpret and communicate results in an easily understandable context to help make swift business decisions.

Natural language interfaces
: This allows users to do querying in natural language, to activate speech-to-text capabilities, and to get results generated—and even spoken—using everyday business language.

Forecast trending and clustering of data
: It takes just one click to get accurate forecasts and predictions based on historical data.

Use proactive, personalized analytics with mobile applications
: Augmented analytics provides a personalized assistant that understands individual users—such as using their location to determine what charts to present to a client at an offsite sales meeting.

Augmented analytics will also be personalized and proactive to the extent that it will present insights based on patterns it detects in users' questions. Through self-learning, it will even anticipate future questions that perhaps a user hasn't yet thought of.

Oracle's Data Analytics Maturity Model

Oracle has defined the analytics maturity model as consisting of three waves: centralized, self-service, and augmented, as illustrated in Figure 1-4.

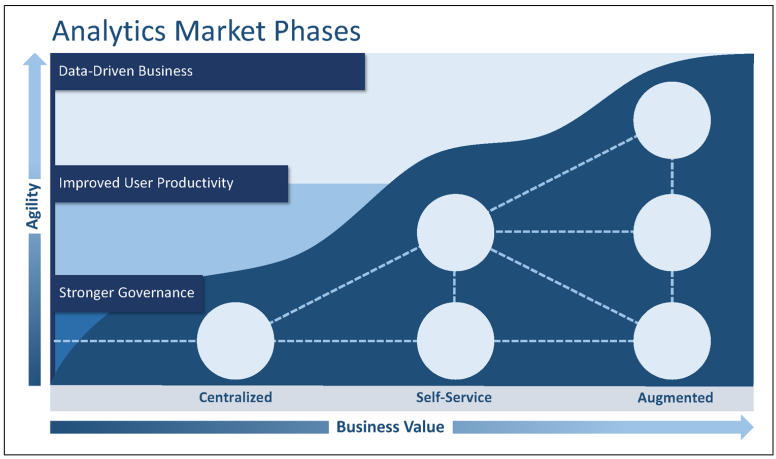

Figure 1-4. The Oracle analytics model (source: Oracle, May 2019)

If you centralize your analytics efforts, you get centralized data and semantic information for consistent metric definitions. This results

in stronger governance than if your data is scattered throughout multiple repositories or datacenters.

If you build a self-service model for analytics so that users don't need to involve a data "gatekeeper" to get access to the data they need, you will boost user productivity dramatically, speeding up business decisions. You will also be able to use nonstandard datasets from external or personal sources, such as suppliers, customers, and external data feeds such as commodity prices or weather data.

Finally, if you apply automation, machine learning, and AI within your analytics process, you will realize faster time to insights from your data, which means faster time to decisions and the ability to become a true data-driven business.

It's important to understand that this is not a linear model. You do not need to centralize your augmented analytics initiative before you implement self-service, or achieve self-service before going augmented.

Leading modern analytics platforms will offer all three of these options at one time.

There are four ways to use analytics:

Descriptive
: This type of analytics simply looks backward at historical information and describes what happened. You can query the data to discover, for example, the retail sales volume last quarter or how high employee turnover was last year. Much descriptive analytics work is done by humans using Excel spreadsheets.

Diagnostic
: Now that you know what happened, you want to know why. You use analytics to find out that the reason overall revenues declined was that sales of women's shoes dropped precipitously, or that the reason for heightened employee churn was that a new manager was hired in the finance department. In this stage, much of the work is still human centered and not yet automated.

Predictive
: Analytics can also be applied to data to make predictions about what will happen next. Based on historical trends—and, importantly, assumptions about the future—what will overall revenues

look like next quarter? The machine does more, and the human less, of the work in this stage.

Prescriptive
: Finally, some recommendations. What should we do to ensure that sales continue on an upward trajectory?

Eliminating Bias from the Equation

The human-versus-machine control aspect of analytics maturity is important. Earlier in the analytics maturity model, analytics tools are controlled by humans—and tend to have human biases. For example, users who seek answers from data will make assumptions. They will choose what data to query, and they will structure queries based on their understanding and preconceived notions about the topic. Because of this, traditional analytics arguably introduces bias into the results.

This is where augmented analytics can shine. The data determines everything—not users' assumptions. For example, traditionally if you want to forecast sales for the next quarter, you would make various assumptions, project it out, and build a model based on your so-called expert judgment. You might estimate what the sales growth rate would be based on economic indicators from Wall Street, for instance. Alternatively, economists could be predicting a downturn, and you might project less ambitious sales numbers.

On the other hand, with augmented analytics, the data itself determines all of these things. The machine learning model parses data to identify which datasets to access in response to a query about future revenues. The model also rephrases the natural language query from the human into machine language that is impartial. The predictions then typically are more accurate and, in many cases, much faster. Also, augmented analytics can actually inform users about other datasets that might be useful in completing a particular analysis.

Augmented Analytics in the Cloud

Although businesses can certainly deploy augmented analytics on an on-premises infrastructure, many, if not most, organizations choose a cloud-based infrastructure. The prime reasons are elastic scalability and cost effectiveness. AI technologies such as machine learning and NLP are very compute-intensive—they require lots of CPUs, or

even very costly graphics processing units (GPUs)—but they are not necessarily predictable in when they demand those resources. Many businesses will thus experience tremendous peaks and troughs in processing, and the differences between the highs and lows can be massive. Businesses that stick with an on-premises infrastructure must plan for those peaks by provisioning sufficient compute, storage, and network resources, and plan for future growth by purchasing all of the resources upfront. This incurs high capital as well as operational costs because of course after those resources have been provisioned and deployed, they must also be managed and maintained. This is not only costly, it is slow given that provisioning new servers can take months in some organizations. And then many of those resources might be left unused much of the time.

Also, because the cloud can handle much larger amounts of data, you never need to aggregate or truncate data so that it fits on your on-premises infrastructure. Optimizing machine learning requires that *all* data be used to produce the most accurate predictions. Data should also be used in its lowest granularity to prevent the introduction of false insights based on preaggregations. Indeed, aggregating or truncating data can defeat the very business agility that analytics is supposed to achieve.

It's not surprising then, that according to a recent Deloitte study, only 15% of companies say they prefer on-premises platforms when deploying AI. (Keep in mind that this 15% of companies includes firms in industries, like finance and gaming, which are required by law to remain on-premises.) The popularity of cloud-based AI platforms is further confirmed by their annual global growth rate, which Deloitte estimates to be a "remarkable" 48.2%.

In the cloud, businesses can dynamically provision whatever resources they need and scale up and down as required. This pay-only-for-what-you-need model is not only cost-effective, but it also makes businesses extremely agile in that new compute and storage can be provisioned in minutes, not weeks or months.

Indeed, the cloud is essential for delivering many of the benefits of augmented analytics, as we explain in the next section.

Benefits and Roadblocks of Augmented Analytics

Many benefits accrue to businesses that move up the maturity curve from traditional analytics to augmented analytics. But there are a couple of potential roadblocks you should be aware of. We cover both in this section.

Benefits of Augmented Analytics

Here are four of the chief benefits that businesses are deriving from augmented analytics.

Make faster decisions

Business agility is on everyone's mind these days. The ability to react swiftly and decisively in response to changes in volatile markets is essential. Today, with new competitors arising from unlikely places, businesses can't wait weeks or even days to get the information required for both strategic and tactical decision making. With augmented analytics, getting complete, easy-to-decipher reports in response to even highly sophisticated ad hoc queries into the hands of those who need them can be achieved much more rapidly than with traditional analytics solutions.

Make better decisions

It's not just speed that matters. In the past, executives would make snap decisions based on limited information and gut feel only—often with disastrous results. With augmented analytics, your decisions can be based on facts and hard numbers. Additionally, because of AI and machine learning, all available data—structured and unstructured—can be processed. Using all available data versus just subsets of data ensures that you get better insights from the resulting analyses, and thus make better, more confident, and more trustworthy decisions.

Democratize data use throughout your organization

There has been talk for decades about the democratization of data—making data available to every employee who needs it—and of empowering citizen data scientists. Augmented analytics finally makes this possible. AI in the form of complex machine learning

algorithms and NLP is all there, under the covers, putting insight at the fingertips of anyone who needs it. In the future, AI will be everywhere analytics is, and will become second nature to everyone.

Leading augmented analytics solutions come with out-of-the-box embedded machine learning and AI models in them, so users can get started immediately on analyses with very little training. Although data scientists are still required to adjust these models or to build additional ones, the productivity of regular business users and nondata specialist users soars immediately upon deploying these solutions.

Become a true data-driven company

Most organizations today strive to be data driven—or to follow what the data tells them. The documented financial payoff is certainly worth it. By deploying augmented analytics, users of all types throughout your organization get the deep insights they need from the data to make better decisions without requiring hand-holding from data professionals or IT.

Roadblocks to Using Augmented Analytics

To take advantage of the many benefits we just outlined, businesses must overcome some obstacles to take advantage of augmented analytics throughout their operations. These barriers fall into two categories: technical and cultural.

Technical impediments

The biggest issue, particularly for larger or more established companies, is the so-called *technical debt*—the existing large investment in legacy technologies that they can't simply abandon in rip-and-replace scenarios. This includes legacy infrastructure, too. How do you cost-effectively move to the cloud for augmented analytics when you've already put substantial investment into traditional on-premises databases and analytics tools? This is not something that can be done overnight.

That's why newer companies, or companies "born in the cloud," will have a much easier time moving swiftly into the augmented analytics world.

Cultural impediments

In addition to technical roadblocks, there are the cultural and organizational issues to consider. It's not easy to move from a traditional analytics model, in which IT acts as gatekeeper to the precious company datasets, to a self-service model in which anyone can query the data to get an answer to pressing business questions.

Although attitudes have improved as data becomes more generally available, there's still the ingrained belief that knowledge is power. People might want to hold onto the advantage they feel they get by knowing things others don't. Training is probably necessary to help employees overcome this barrier.

Perhaps most important, decisions should no longer be made by the HIPPO (the highest-paid person in the office) but by listening to what the data tells you. This can be an immense cultural shift—asking people to come to meetings armed with data, not opinions.

Although a fairly recent technological development, augmented analytics is already being used by Fortune 1000 companies throughout various industries—including manufacturing, finance, life sciences, ecommerce, energy, internet, and health care. We discuss who uses augmented analytics in the next section.

Who Is Using Augmented Analytics?

Augmented analytics is being used today to get accurate, unbiased, and actionable insights across a broad range of business functions. Here are some of the ways it is being used:

Sales

Salespeople don't need to know what datasets might have the information they are looking for, and they don't need to learn difficult statistical terms or interfaces. They can say "show me sales for this region," and the NLP technology interprets that speech into language the system can understand. The machine learning finds the relevant data and even determines the best charts to show to visualize the data in context. Salespeople can use this in the field on their mobile devices, and intelligent locator technology such as GPS will let the system know what geographical data is relevant. A sales professional might want to do a more complex analysis, and ask "Why are sales down in our eastern territory?" The machine learning system will perform a

root cause analysis and display the answer in easily understandable words and graphics.

Marketing
: Marketing professionals today want quantitative results for how well their campaigns are doing on a very granular level—and then they want to drill down to see why a particular campaign might be doing better in one region or among one customer segment than another. Augmented analytics can do this and also inform marketers about the existence of additional data about target audiences that they weren't aware of that will make campaign targeting much more effective.

Finance
: With traditional analytics, financial predictions involve making a significant number of assumptions: estimated economic growth, expected interest rates, or other external forces over which finance professionals might have opinions but not facts. With augmented analytics, the machine learning bases its predictions on the data only, leaving individual judgment and biases out of it, so organizations get more accurate predictions about revenues and profitability.

Human Resources (HR)
: With traditional analytics, it's common for HR professionals to ask questions like "Why is attrition up?" only to get historical charts of the last three or six months of employee turnover. They need to dig in further—typically involving IT or data specialists—to try to understand *why*. Augmented analytics makes the answer to this question actionable. For example, an analysis of the data could show that turnover is highest around the time of employee annual reviews, signaling something is wrong with that process, upon which HR can take immediate action.

To get results like this, companies need to follow some best practices that pioneers and experts in augmented analytics have identified.

Best Practices for Augmented Analytics

Although the rewards are considerable, moving up the data analytics maturity curve takes time—and care. Here are some best practices for successfully deploying augmented analytics.

Mandate Data-Driven Decision Making from the Top Down

Senior management must get behind it. No longer can business departments or groups make decisions based on what the HIPPO demands. No one should come to a meeting unless prepared to present data that supports their position. Incentives should be structured to reward those who make data-driven decisions.

Empower and Trust Users Throughout Functional Areas and Organizational Levels

Moving to augmented analytics requires moving to a self-service data model, which in turn requires trust. This requires building an "enlightened" organizational culture in which leaders—business and technical—release control to users so that they can access and use data to make decisions as appropriate to their roles and responsibilities.

Balance Self-Service with Centralized Governance

Most organizations with low analytics maturity do not have formal data governance programs in place. They might have thought about it, and they might understand the importance of it, but they simply don't know where to start. Small companies, especially, struggle because of the cost barrier of entering into the realm of data centralization and imposing proper governance on analytics initiatives.

Data governance is simply the rules by which data is managed. This includes acquiring, storing, moving, transforming, analyzing, reporting, and deleting it. It is the framework by which data is ensured to follow both internal and external guidelines for security and privacy. This means that organizations must understand how data is collected, how it is used, how it moves through the organization, how it's changed, and how it's stored. They also need to ensure that access to data is given on the principle of permissions: there's no reason why a finance professional should have access to HR data, and vice versa. So, you build user profiles to ensure that people have access to only the data they need to do their jobs. In short, self-service needs to be carefully balanced with a robust governance framework that ensures secure data access.

Ensure a "Single Source of Truth"

In companies that are still stuck in Excel-based analyses, it's common for different users to download different versions of data onto their desktops or laptops, do independent transformations on that data, and end up with results that vary widely from one another. A best practice for organizations is to know where their true data resides, who owns it, and who manages it so that everyone in the organization is working off the same version of it, and it isn't inadvertently changed or corrupted. If your organization currently lacks a single source of truth, you might have a problem trusting the results of analyses. Conversely, if everyone is working from the same dataset, the resulting predictions and insights will be more credible.

Also critical is to ensure consistency of metrics and calculations. You do this through the *semantic layer* of your information model—a common business language that is used to describe data so that users throughout the enterprise have the same definitions of such things as product, customer, revenue, and more.

Visualize Big, But Think Small

It's additionally important to have a long-term strategy that clearly lays out the business value you expect to get from augmented analytics. Then, think small within that vision: after you have your overall strategy in place, you should adopt augmented analytics on a case-by-case basis based on business needs and where you foresee getting the maximum payoff. Identify those cases that are directly tied to immediate business objectives and that promise a high ROI. Avoid leaping head first into a massive five-year, rip-and-replace project. Instead, show the value you can get from augmented analytics early and often, always staying within the parameters of your long-term vision. Leading augmented analytics platforms allow you to look for quick wins and to use the hybrid cloud—part on-premises, part cloud—as your environment. That way, you can get something up and running quickly, with minimal disruption and training required for your staff, while retaining overall flexibility.

Consider Moving to the Cloud

If they haven't already done so, businesses interested in augmented analytics should consider the cloud. The cloud gives you the flexibility to move your workloads to where they run best and more eco-

nomically; the elasticity to scale up and down as your business demands; robust security; the agility to move on new opportunities immediately; and the cost effectiveness of paying only for the resources (compute and storage) that you need. All of these will contribute to the success of any augmented analytics initiative.

Empower Everyone with Access

With the current dearth of sufficient data scientists, it's essential to put people and processes in place so that employees, customers, partners, and suppliers will use augmented analytics to make business decisions. Anticipate upcoming requirements based on your overall vision and strategy, and allow yourself sufficient time to secure the resources you need. Keep IT, data, and business teams aligned so that each is aware of the other's needs—and challenges.

Real-World Uses of Augmented Analytics

In this section of the report, we examine how two leading companies—one an established consulting firm, and the other a fast-growing technology firm—are using augmented analytics to gain a deeper understanding of their internal operations and how to optimize them while also enhancing their commercial products to better meet the needs of customers.

Accenture

Accenture is a leading global professional services company, providing a broad range of services and solutions in strategy, consulting, digital, technology, and operations. Combining deep experience and specialized skills across more than 40 industries and all business functions, Accenture works at the intersection of business and technology to help clients improve performance and create sustainable value for stakeholders.

Making Augmented Analytics Accessible to All

Through the Accenture myConcerto platform—and, within that platform, the Accenture Digital Boardroom—Accenture is harnessing augmented analytics using the Oracle Analytics Cloud to help its clients transform virtually every aspect of their businesses: finance, supply chain, procurement, human capital management, and others.

In effect, myConcerto is an end-to-end integrated digital platform consisting of thought leadership, approaches, methodologies, assets, and accelerators that Accenture customers can apply to their most complex business scenarios. An insight-driven, integrated platform, myConcerto helps organizations boost their ability to innovate, amplify business results, and accelerate their journeys to becoming intelligent enterprises.

"Think of myConcerto as our one-stop shop for everything you need in Oracle Cloud," says Patrick Sullivan, head of Accenture's Oracle Business Group in North America. "Everything we do, from SaaS [software as a service], to PaaS [platform as a service], to IaaS [infrastructure as a service], and to all the different subclouds, are in it."

So, whether a client is seeking augmented analytics, enterprise resource planning (ERP), or human capital management (HCM) solutions, they'll find all of Accenture's intellectual property, innovation accelerators, assets, and solutions within myConcerto, says Sullivan—and it's purpose-built for Oracle Cloud.

The Digital Boardroom is one of the offerings within myConcerto. "With the Digital Boardroom, we've embedded our proprietary predictive analytics, proven models, and applied intelligence assets along with best practices into Oracle Analytics Cloud to create a single intelligence platform," says Brad Genson, head of Accenture's Oracle Analytics Group for North America. "We're showing executives that they can not only see how their businesses are doing now, but they can also predict, and look into the future, as well."

Accenture believes that the Digital Boardroom is unique in the market because of the Accenture thought leadership that it uses to augment Oracle Analytics Cloud. "We harvest our thought leadership on what metrics are critical in managing finance, in managing HCM, and in managing the supply chain. We add in our predictive analytics assets and experience to complement what Oracle Analytics already delivers," says Genson.

Real-World Deployments of the Digital Boardroom

Already in use around the globe, the Digital Boardroom has been proven successful across a number of corporate functions. Here are two use cases: ERP and HCM.

Use case #1: ERP

One of Accenture's clients had just completed a finance and HCM software-to-service deployment. The initiative was very successful, achieving all of its desired results. But some of the executive sponsors wanted more. They hoped to derive additional value from the investment and thought it could be done by using analytics on all of the data that was flowing in.

One of the key challenges was that valuable data still existed in silos. Users seeking metrics on liquidity needed to delve into one set of Excel files. Users wanting to track spend against budget by department would need to go to another set. It was inefficient and wasted the time of valuable knowledge workers.

Accenture worked with the client to rapidly pull all of the data into the Oracle Cloud and deploy Oracle Analytics Cloud. "We harvested some of our initial thought leadership and decided what we thought was important from a financial point of view," says Genson. Accenture then "baked" that into Oracle Analytics and was able to rapidly deploy a CFO dashboard in just four weeks. "We improved visibility into the firm's liquidity as well as other core financial metrics and really improved the value for the CFO and the benefits they were getting from the overall initiative," Genson says.

With visibility to the problem and opportunity areas, the organization is seeking to achieve the following sampling of benefits to improve overall liquidity and cash flow position:

- 85% to 95% accuracy in forecasting capital availability
- 5% to 7% reduction in late payments
- 5% to 10% recovery and reduction of excess payments
- 20% to 30% increase in cash collection
- 10% to 20% working capital benefit by optimizing payments
- 80% to 90% identification of travel and expense violations
- 1% to 3% reduction of travel and expense costs

Among other things, the augmented Oracle Analytics solution gave executives very fast and granular access to corporate spend data, so they could see what departments were over budget while accessing a clear view of how well they were doing on contract compliance.

Augmented analytics was a key part of this. Executives could apply predictive analytics to do "what-if" scenarios.

For example, executives could use the capabilities of Oracle Analytics to simulate moving 50% of off-contract spend to contracts over the fiscal year to see how much they would save with next-best actions. Organizations can analyze which departments were overspending, and why. It turned out in this case that a significant amount of travel was not being booked according to company policy. That spend was substantially higher in a specific bracket of employees, so the firm was able to take corrective action on that behavior as well.

Here's a sampling of benefits the analytic platform projects to achieve through in-depth spend visibility:

- Up to 99% spend compliance within specified categories, saving more than $5 million on annual basis
- Up to 90% accuracy of spend categorization
- 5% to 9% reduction in value leakage due to process and policy noncompliance detection and avoidance
- Reduced lead times, optimized buying channels and increased spend with preferred vendors
- 2% to 5% reduction in procurement spend
- 3% to 5% cost savings through increased and accelerated spend savings realization

In addition to this ERP use case, Accenture has also found success applying augmented analytics to HCM use cases.

Use case #2: HCM

A global travel brand had just completed a number of acquisitions. Accenture used Oracle Analytics to build out a CHRO (chief human resources officer) dashboard on the Digital Boardroom platform based on the brand's business scenarios, its own thought leadership, and its analytics assets.

With all these disparate properties under its umbrella, the travel company's goal was to understand how customer satisfaction varied across them. Its overall customer satisfaction ratings were high, but certain properties were underperforming, and the company wanted

to understand why. Accenture standardized all HCM data globally in the Oracle Cloud and then used the augmented analytics of Oracle Analytics Cloud and the Digital Dashboard on top of its proprietary HCM capital.

"This enabled them to see and correlate brand customer satisfaction with other data properties, and truly understand from an HCM point of view what was impacting customers," says Genson. "The business sponsor of that program said, 'Analytics has really sold this HCM journey into our organization,'" says Genson.

In this case, employee engagement and performance is influencing customer satisfaction. With visibility to the "right metrics" at speed, the organization is able to focus more efficiently on those activities that lead to improved employee engagement. Using Oracle Analytics Cloud, the organization is realizing strategic workforce planning cost savings that are in part redistributed to those activities, which ultimately increase brand value and revenue. Following is a sample of projected benefits:

- Improvement in key recruitment metrics, resulting in reduction in time to fill and cost per hire while increasing the quality of hire:
  - Reduction in average time taken to fill from 70 days to 40 days
  - Employee matching and optimization increase of 25% to 40%, reduction in scheduling effort, and 5% to 20% reduction in overdue demands
  - Recruitment cost savings of more than $550,000 annually and 25% to 50% reduction in screening effort
  - Increase quality of hire by 100 basis points
- Meaningful revenue increase by shifting the high-performance curve
- Succession planning reducing revenue leakages and time to competence
- Retention savings of $3 to $6 million for every 1% reduction in attrition

- Emerging skills analysis potentially leading to 5% to 10% reduction in compensation cost and reduction in lead time to fill by 25% to 30%

All of these benefits were driven by the use of the Accenture Digital Boardroom, which we will discuss more thoroughly in the next section.

Constantly Enhancing the Digital Boardroom

According to the Accenture TechVision 2018 report, 79% of executives are basing their most critical strategic decisions on data. Yet most of them, 94%, have not invested in capabilities to verify the veracity of the data.

"This is a big problem, and that's what the Digital Boardroom solves. You now have a single source of truth," says Sullivan. "Regardless of the use of machine learning, and AI, and all the buzzwords, we focus on helping companies make the right decisions with the right data to achieve a competitive advantage. That's the real business problem that we're trying to solve."

"Everyone wants to try AI machine learning because they're reading about it everywhere today," agrees Genson. "We believe it combines Accenture experience to show those executives what's possible."

The Digital Boardroom depends on Oracle Analytics as its foundation. On top of that, Accenture has layered its own extract, transform, and load (ETL) processes to load the data. It has embedded its own data visualization assets into Oracle Analytics. And it uses the open source coding language Python as well as the R capabilities of the Oracle database.

Accenture is constantly innovating its Digital Boardroom. "Every month, we gather input from our clients' projects: what they're seeing; what innovation is happening with them. We're also constantly gathering input from Oracle. We embed all that we learn into the Digital Boardroom," says Genson.

Riverbed

Riverbed Technology, Inc., The Digital Performance Company™, creates software and hardware focused on digital experience management and next-generation infrastructure that includes network

performance monitoring, application performance management, end-user experience monitoring, edge computing, WiFi, and wide-area networks (WANs), including SD-WAN and WAN optimization. For the sixth consecutive year, Riverbed has been named a leader in the Gartner Magic Quadrant for Network Performance Monitoring and Diagnostics, and its customers include some of the largest brands in the world. Founded in 2002, Riverbed is based in San Francisco.

Bhishma Jani, senior director of IT at Riverbed, joined Riverbed from Oracle in 2015 to help the firm make a major pivot in how it managed data. Specifically, he was hired to move from traditional analytics to modernizing the platform to make next-generation advanced analytics—specifically augmented analytics—possible.

"We saw back then how things were going to move in the next five years, which is using AI to do predictive, advanced analytics on big data," says Bhishma. "We wanted to get there before the competition."

Since that date, Riverbed has used Oracle Analytics Cloud to completely transform its use of data, its systems—and its very business.

The Way Things Were

Prior to its analytics transformation initiative, Riverbed did only traditional reporting of operational enterprise data. "This was important to us but did nothing special that edged our business up a notch or two," says Bhishma.

Technically, the data was isolated into silos. This data was too fragmented and distributed to too many places to be reliable across the enterprise. Because of this, none of it could be combined with other data and put into AI models to make predictions of enterprise-wide behaviors or trends. All of the databases were on-premise, and there was a lot of other "technical debt" that prevented Riverbed from deriving full value from its data.

Use case #1: Generating revenues through on-time renewals

At its simplest level, Riverbed sells network-monitoring hardware with software embedded inside it. It sells these products under contracts that need to be renewed for Riverbed to keep revenue flowing. But it was difficult for the company to get a clear picture of which

customers were going to renew. More specifically, Riverbed didn't know which customers were going to do early renewals, which would do just-in-time renewals, and which ones would need extra hand-holding to make sure the renewals were done within a certain grace period after contracts expired.

Because subscription renewals represent a significant percentage of Riverbed's total business, this added up to significant dollars. Riverbed thus had a dedicated renewals staff responsible for ensuring that as many customers renewed as early as possible. But the team was flying blind. It had to contact clients to renew without knowing anything about them. Were they satisfied customers? Did they have high net promoter scores (NPS)? Or were they having problems with Riverbed or its products?

"The organization as a whole was not sufficiently supporting the renewals team," says Bhishma. "And that meant there was potential money being left on the table."

Today using the built-in augmented analytics capabilities of Oracle Analytics Cloud, Riverbed is able to process a lot more data indicators—not just the expiration date of the service contracts—to give to the data renewals team to know which customers to contact and when. These indicators include the number of support cases a customer has logged, the particular mix of Riverbed products it has deployed, discount rate, and the telemetry data coming from its network devices.

"We internally call this blending of data the 'data fabric,' and then we push it into our AI engines on Oracle Analytics Cloud to give us outcomes that are then visualized in various ways, depending on what the user prefers," says Bhishma.

For example, the analytics outcomes can be visualized in Riverbed's transaction systems like Salesforce and Oracle, in standalone dashboards so that the renewals staff can be right on top of it. "Early renewals have been going up, and since it's all iterative rinse and repeat to learn through AI, it's only going to get better," says Bhishma.

In a Q1-to-Q1 year-to-year comparison of 2018 to 2019, the early renewals went up 8%. The on-time renewals shot up 16%, and delayed renewals declined by 8%.

Use case #2: Revenue forecasting and monitoring

The second area that Bhishma and his team targeted was sales forecasting and monitoring. The way it worked in the past, customers would say they were committing a certain amount of money—say $20 million—to buying Riverbed products in a certain quarter, but these commitments were not necessarily accurate.

Just like in the renewals data pipeline, Riverbed wrote an AI model that took into account many more data points than simply what the customer said it intended to buy. These data points included what the customer has purchased historically; what time of year the purchase is taking place; what other, similar customers are purchasing; and other key data elements. The AI model in Oracle Analytics Cloud would take all those influencers and come up with a score that said, for example, that the customer had an 87% chance of actually purchasing $20 million of Riverbed products. This helped Riverbed forecast sales much more accurately, and plan resources accordingly.

Riverbed intends to use the same data for its manufacturing and fulfillment teams. "We plan to leverage the same forecasting capability, and map it to fulfillment mechanics, which includes demand planning and inventory management," says Bhishma. For example, in the past there would be situations in which a sales representative would predict selling 500 products to a customer, but when the order was actually written, it was closer to 80 products. The company would then need to absorb the extra inventory.

Use case #3: Win-back campaigns

Another very successful revenue-generating application of Oracle Analytics Cloud and augmented analytics was in a revenue win-back campaign. Traditionally, Riverbed had trouble identifying how many of its products—called assets—were out in the field being used by customers yet not covered by service contracts.

"These are current customers, these are happy customers, but also customers who broke down their old service contracts and by virtue of that, the assets got distributed so that we lost track of them," says Bhishma.

By analyzing the data coming in from its assets—which Bhishma said were very "chatty" and therefore generated a lot of data to analyze—Riverbed was able to find out how many assets were being

used for the purpose that the customer had purchased them but not covered by service contracts, "and all we had to do is just make a polite call to the customer and reconnect to win back that renewal revenue. No audit was necessary," he says. In the initial deployment of that use case in North America, more than $1 million was recovered. "So, we were able to improve the bottom line by a good chunk of cash," says Bhishma.

A Three-Pronged Transformation

This transformation brought about by Oracle Analytics Cloud and augmented analytics had three components: an organizational component, a technical component, and a cultural component.

Organizational transformation

Organizationally, Riverbed had to create an entire data science function that didn't exist. Today, Riverbed has an entire data team consisting of data scientists, data architects, and data operations professionals, all under one umbrella. "The data architects make sure that the data is piped in correctly and is available to the data scientists, who can then focus on things like what's the right AI algorithm to apply, and on outputs," says Bhishma. The data architects and the data operations team then make sure they have all these data feeds maintained and continually enriched.

When the team identifies new sources of data, it can tap into them and immediately build a pipeline for it, so that data-wise more information is coming in. Then, the scientists can pull that into Riverbed's AI core and begin to get outcomes from it.

Technology transformation

The technology transformation was another piece. After evaluating vendors, Riverbed chose Oracle Analytics Cloud, and moved all its data over to Oracle's cloud infrastructure to take advantage of Oracle Analytics Cloud and its inline AI capabilities. It used, among other capabilities of the Oracle Cloud infrastructure, Identity Service (SSO), Database Service, Infrastructure Service, and Data Integration Service.

"I refer to Oracle cloud infrastructure as a department store. If you want to buy shoes, you can buy shoes," says Bhishma. "You can buy

yourself cologne, or a suit. Whatever you need to dress up for the occasion."

Riverbed has a robust backend structure in place. Its data warehouse continues to enhance and is optimized for data extraction mechanisms orchestrated using Riverbed Steelhead to ensure no data latency. It can connect to any number of sources, including external and on-premises data sources. Oracle Analytics Cloud provides the virtualization as well.

"And last but not least, compute is always available in the cloud," says Bhishma. "So, I can buy compute, augment with my own special sauce algorithms—our own AI core—and then make them all work in sync."

Cultural transformation

Riverbed also underwent a cultural transformation, which involved teaching everyone in the organization—not just the data team—what AI and augmented analytics would do for them. The breakthrough for achieving this was when Riverbed's data team created an "AI intake" form. A simple one-page questionnaire, this form asks nontechnical users to document the outcomes they are looking for from a predictive analytics point of view. For example, a finance analyst might write that she wants to predict revenues more accurately. An HR specialist might want to forecast employee attrition.

The data team takes that form and translates it into data science–speak by deciding how they will source the data, how they will build the model, and how they will train the model. They do some sample run-throughs of the model and iterate with the users until they get it right.

"And that becomes a good way for users to comprehend that AI is working for them, now," says Bhishma.

"For us, this is the big grounding document that helps everybody," says Bhishma. "Technical folks can translate what users say into technical language, and users get a sense for how the data scientists are going about doing everything underneath the hood."

At the same time, users are getting educated about augmented analytics. "They can then say, 'Well, you know what? I just realized that we have some other data that we can bring in, which might further refine our criteria,'" says Bhishma. "And we discuss it and we say,

'Okay, we'll bring that data in, here is what the sample training criteria is,' and then we enable that particular data."

The Future

Riverbed now plans to go deeper into augmented analytics to the point of embedding it into its products.

For example, Riverbed sells a product for end-user experience monitoring, Riverbed SteelCentral Aternity. In late March 2019, Aternity reported that Oracle Analytics Cloud performance had gone below its threshold. The tool automatically triggered an alert and Riverbed was able to take the necessary steps. "This worked the way it was designed. But we want to get into the business of not only alerting but remediation," says Bhishma. "So, we're examining how we can utilize our end-user experience monitoring tool with the server experience monitoring tool (App Response) along with SD-WAN optimization capabilities for rapid remediation. Orchestrating between these products is where we'll be leveraging AI and Oracle Analytics Cloud."

Riverbed is thus moving from internal use of augmented analytics to actually putting it into products for customers.

"We're heading in that direction now to make our products more exciting and interesting," says Bhishma. "We see augmented AI-driven analytics as a way to improve our bottom line by increasing revenues and giving us opportunities to reduce expenses."

In summary, augmented analytics is proving to be a much higher-level solution than traditional analytics for Riverbed. "It's very strategic for us," Bhishma says.

Takeaways from User Stories

As we've seen from both Accenture and Riverbed, augmented analytics is real, and delivering real results in the real world. Both companies are using Oracle Analytics Cloud's advanced analytics capabilities to gain insights into their internal operations and to embed as features into products for external customers. Whichever type of deployment your organization chooses, it is clear that competitive advantage follows. Accenture's advice to companies that have not yet embraced augmented analytics? Don't be afraid. Get

started. Don't wait for the right opportunity. You can use the technology today to add significant value.

"Figure out what is right for your organization, what's going to have the biggest impact, and get started," says Genson.

Data is powerful, says Sullivan. If you can unlock the value of the years and years and years of enterprise data that you possess, and use that to make informed decisions, it becomes a weapon for your business.

"We've got clients that are using what we've built for them using Oracle Analytics and the Digital Boardroom, and they're going to seize the leadership positions in their industries," says Sullivan. "They're able to make decisions real-time, versus waiting for data scientists, data engineers, and analysts to sort it all out."

Because of this, the Digital Boardroom, based on Oracle Analytics, "offers a massive competitive advantage," says Sullivan.

Conclusion

For all the hype surrounding advanced analytics, machine learning, and other data innovations, a surprising number of organizations still depend on spreadsheets for analyses.

Low maturity can be the result of limited budgets, lack of vision and skills, inexperience in strategic planning and deployment, primitive or aging infrastructure, or simply because things have always been done a certain way. Organizations in the early stages of data and analytics maturity often do not have the ability to exploit advanced analytics. They struggle to deal with poor data quality, inconsistent processes, and poor coordination across the enterprise. Complex business practices also inhibit analytics.

With augmented analytics, you can uncover what drives your business and understand data to uncover hidden insights that lead to better decisions. Using a leading augmented analytics platform can help organizations quickly and effectively realize the benefits of machine learning and spread the use of data-driven behaviors throughout their organizations.

When machine learning is embedded within analytics, it will accelerate time to insights from all data—any data. The addition of machine learning has instant and lasting benefits for helping

uncover hidden insights, removing human bias, predicting results, and even making smart, prescriptive recommendations on what to do next. Now *that's* real business value.

About the Author

Alice LaPlante is an award-winning writer who has been writing about technology and the business of technology for more than 20 years. The former news editor of *InfoWorld*, and a contributing editor to *Computerworld*, *InformationWeek*, and other national publications, Alice was a Wallace Stegner Fellow at Stanford University and taught writing at Stanford for more than two decades. She is the author of six books, including *Playing for Profit: How Digital Entertainment Is Making Big Business Out of Child's Play* (Wiley).